Amendments to the Specification:

Please replace the paragraph beginning on page 4, line 13 with the following:

In one aspect of the invention, the disclosure illustrates a method for modeling the behavior of a data channel. To create the model, the sequence of data input to the data channel is examined. A portion of the sequence of data input to the data channel is used as an index to a channel model value. Output data from the channel is sampled. A numerical channel model value is compared with the sampled value and the channel model value is adjusted based on the results of the comparison. The difference between the model value (e.g., stored in a table) and the actual channel value may be used to correct the model value in the table using a LMS (Least Means Squared) algorithm.

Please insert the following paragraph before the "BRIEF DESCRIPTION OF THE DRAWINGS" heading at page 4, line 30.:

A nonlinear channel having memory modeled in terms of Volterra Kernels may equivalently change into a look up table model using the Hadamard transform. The Volterra Kernel representation also has the added advantage that it can represent a look up table of N table entries in at most N-1 Volterra kernels. In many cases only a few Volterra Kernels are required to model the behavior of the channel. For example embodiments are disclosed in which two Kernels may model a

nonlinear fiber optic channel, operating at a wavelength of 850 nanometer through a multimode channel at a data rate of 1 Gigabit per second.

Please replace the paragraph beginning on page 19, line 25 with the following:

A program listing of a computer program may be used for the channel studies ~~is included as Appendix A~~. Essentially, ~~the program~~ such a program takes an input block of data from the measurements ~~processes~~ it processes, and then trains the canceller. It then computes the Volterra Kernels coefficients of the model using the linear model or the nonlinear model. The program computes a signal to noise ratio and it prints out the results.

Please replace the paragraph beginning on page 20, line 3 with the following:

The electrical signal commonly results from converting ~~han optical~~ an optical signal to the electrical domain using an optical to electrical converter 1307, such as for example a PIN diode, avalanche photodetector (APD), or another detector. The optical to electrical converter signal is amplified using a transimpedance amplifier (TIA) 1309 and a postamplifier 1311. The postamplifier 1311 generally should not hard-limit a signal provided to it as hard limiting may introduce nonlinearity.

Please replace the paragraph beginning on page 21, line 9 with the following:

In practice, a training sequence may not be required because the ~~decisions 1307~~ decisions 1319 of the decision feedback equalizer 1300 and the nonlinear channel estimator 1305 may still converge. Initially, because the channel estimator 1305 is not trained, the ~~decisions 1307~~ decisions 1319 will have multiple errors. There is however, in most channels, a bias towards good decisions. Most decision feedback equalizers will converge if the channels do not exhibit excessive intersymbol interference (ISI). Accordingly, if the coefficients in the nonlinear channel estimator 1305 are incorrect initially, there are both good and bad decisions. As long as the good decisions outnumber the bad decisions, there will be a converging trend and the nonlinear channel estimator 1305 will eventually tend to converge.

Please replace the paragraph beginning on page 22, line 5 with the following:

Once there is an initial convergence in the nonlinear channel estimator 1305 the signal to the slicer 1303 is improved because at least some of the intersymbol interference is cancelled in summation unit 1301. As a result the number of correct ~~decisions 1307~~ decisions 1319 increases which leads to a better channel estimation. Past decisions are stored within the nonlinear channel estimator 1305 and are used to compute a

replica of the intersymbol interference in order to provide it to summation unit 1301.

Please replace the paragraph beginning on page 22, line 20 with the following:

Figure 14A is a block diagram of an exemplary nonlinear channel equalizer as may be used in the nonlinear decision feedback equalizer of Figure 13. The nonlinear channel estimator of Figure 14 is similar to the Volterra Kernel model illustrated in Figure 5. The Volterra Kernel model of Figure 5 was used as an illustration of characterization of the channel. The nonlinear channel estimator illustrated in Figure 14 has an LMS update loop similar to Figure 5. Additionally, similar to Figure 5, the number of Volterra Kernels employed would depend upon the characteristics of the channel and the laser used to drive the channel.

Please replace the paragraph beginning on page 22, line 30 with the following:

In Figure 14A, a signal 1427, which has been provided from an optical channel and converted to an electrical signal, is accepted by an optical channel equalizer, shown generally at 1400. The equalizer 1400 accepts the signal 1427 into a summation unit 1301 where a (negated) correction signal 1429, representing the predicted inter-symbol interference, is added. Prior to the training and convergence of the Volterra Kernel

estimator correction signal is zero or an arbitrary value. Slicer 1303 makes ~~decisions 1307~~ decisions 1319 as to the values of the signal transmitted. ~~Decisions 1307~~ Decisions 1319 are accepted by Volterra Kernel estimator 1401, which models the nonlinearities of the channel that provides the signal to the equalizer 1400. The output of the Volterra Kernel estimator provides a value of predicted intersymbol interference 1429, which can then be subtracted from the accepted signal in order to accurately recreate a transmitted signal which has been transmitted.

Please replace the paragraph beginning on page 23, line 12 with the following:

The error in the predicted intersymbol interference 1429 is estimated by comparing ~~decisions 1307~~ decisions 1319 from slicer 1303 with the input signal 1422, which has been adjusted in summation unit 1301 by removing the predicted intersymbol interference ISI 1429. The ~~decisions 1307~~ decisions 1319 and error 1425 are used to adjust the FIR filters 511, 513, 515, and 517, which exemplarily illustrate the FIR filters which comprise the Volterra Kernel estimator 1401. In such a manner, the Volterra Kernel estimator may be trained and compensate for non-linearities within the channel that provides the signal to the equalizer 1400.

Please replace the paragraph beginning on page 23, line 24 with the following:

Figure 14B is an exemplary block diagram of a non-linear optical channel equalizer employing a lookup table channel estimator, according to the embodiment of the invention. In ~~Figure 14 B~~ Figure 14B an LMS algorithm may be employed in adjusting the values within the look up table 1435. The system 14B may be operated so that training of the equalizer is accomplished by processing of a signal provided from an optical channel, determining error signals and adjusting the equalizer 1401. In such a manner the equalizer may be trained to model the channel parameters. Those skilled in the art will recognize that the equalizers may be trained by employing a known sequence. Because such a sequence is known a priori the difference between the response of the channel and the desired response of the channel, i.e., the known sequence, can be readily determined. Such sequences may shorten the time necessary to train a nonlinear optical channel equalizer.

Please replace the paragraph beginning on page 25, line 3 with the following:

The Viterbi decoder includes a receiver for receiving a signal including linear and non linear components. A non linear channel estimator computes the expected values of the received signal. A branch metrics computer computes the branch metrics based on the expected values of the received signal. A standard Viterbi decoder accepts the computed branch metrics and decodes the received signal. The non linear channel estimator can be fabricated using a Volterra kernel estimator ~~or~~

~~a lookup table estimator~~ as illustrated at 1401 ~~as illustrated at 1433~~ in Figure 14A or a look up table ~~implementation~~ estimator as illustrated at 1433 in Figure 14B.